WHAT IS CLAIMED IS:

1. A nuclear fission reactor comprising:
   a. a core comprising a fissile metal hydride;
   b. an atmosphere comprising a hydrogen isotope to which said core is exposed;
   c. a non-fissile material that absorbs and desorbs said hydrogen isotope based on temperature;
   d. a means for controlling said non-fissile material temperature; and
   e. a means for extracting energy produced in said core

2. The nuclear fission reactor of claim 1 wherein said energy extracting means comprises at least one elongated structure containing a flowing nonhydrogenous fluid.

3. The nuclear fission reactor of claim 2 wherein said nonhydrogenous fluid comprises at least one nonhydrogenous liquid metal.

4. The nuclear fission reactor of claim 3 wherein said at least one liquid metal is selected from the group consisting of liquid potassium and liquid sodium.

5. The nuclear fission reactor of claim 2 wherein said at least one elongated structure is configured as a heat pipe.

6. The nuclear fission reactor of claim 2 wherein said nonhydrogenous fluid comprises at least one nonhydrogenous gas.

7. The nuclear fission reactor of claim 6 wherein said nonhydrogenous gas is selected from the group consisting of helium, argon, nitrogen, and carbon dioxide.

8. The nuclear fission reactor of claim 1 wherein said fissile metal hydride comprises fissile uranium hydride.

9. The nuclear fission reactor of claim 1 wherein said core consists essentially of U and UH_3 and intermediate states therebetween.

10. The nuclear fission reactor of claim 1 wherein said atmosphere consists essentially of said hydrogen isotope.

11. The nuclear fission reactor of claim 1 wherein said atmosphere consists essentially of a mixture of deuterium and protium.

12. The nuclear fission reactor of claim 10 wherein said atmosphere includes non-essential reactor byproduct gases.

13. The nuclear fission reactor of claim 12 additionally comprising a gas extraction apparatus for extracting said non-essential reactor byproduct gases.

14. The nuclear fission reactor of claim 13 wherein said gas extraction apparatus comprises at least one gas port in a containment vessel of said nuclear fission reactor.

15. The nuclear fission reactor of claim 1 additionally comprising a hydrogen isotope pressurization apparatus for providing hydrogen isotopes to said nuclear fission reactor.

16. The nuclear fission reactor of claim 15 wherein said hydrogen isotope pressurization apparatus comprises at least one gas port in a containment vessel of said reactor.

17. The nuclear fission reactor of claim 1 additionally comprising a hydrogen isotope extraction apparatus for removing said hydrogen isotopes from said reactor.

18. The nuclear fission reactor of claim 1 wherein said non-fissile material comprises a non-fissile metal hydride.

19. The nuclear fission reactor of claim 18 wherein said non-fissile material comprises a non-fissile uranium hydride.

20. The nuclear fission reactor of claim 19 wherein said non-fissile material consists essentially of U and UH_3 and intermediate states therebetween.

21. The nuclear fission reactor of claim 1 additionally comprising a plurality of trays holding said non-fissile material.

22. The nuclear fission reactor of claim 1 additionally comprising a neutron reflector between said core and said non-fissile material.

23. The nuclear fission reactor of claim 22 wherein said neutron reflector is selected from the group consisting of beryllium and stainless steel.

24. The nuclear fission reactor of claim 1 additionally comprising thermal insulation means between said core and said non-fissile material.

25. The nuclear fission reactor of claim 1 wherein said fissile metal hydride comprises at least one fissile actinide hydride.

26. The nuclear fission reactor of claim 25 wherein said at least one fissile actinide hydride is selected from the group consisting of hydrides of uranium and plutonium.

27. The nuclear fission reactor of claim 25 wherein said core additionally comprises at least one fertile actinide hydride.

28. The nuclear fission reactor of claim 27 wherein said at least one fertile actinide hydride is selected from the group consisting of hydrides of U^{238} and Th^{232}.

29. A nuclear fission reaction method comprising the steps of:

a. providing a nuclear reactor core comprising a fissile metal hydride and a non-fissile hydrogen isotope absorbing and desorbing material within a pressurization vessel;

b. pressurizing said pressurization vessel with an atmosphere comprising at least one hydrogen isotope;

c. increasing said non-fissile hydrogen isotope absorbing and desorbing material temperature to desorb said at least one hydrogen isotope with a concomitant increase in moderation of said nuclear reactor core to establish criticality;

d. establishing criticality of said nuclear reactor core to generate a resultant heat energy; and

e. extracting said resultant heat energy.